

CLAIMS

- 1 1. A method of imaging portions of a workpiece located within a field of
2 view of an imaging system, the workpiece having features which are to be
3 detected with the imaging system, the method comprising:
4 illuminating a first portion of the workpiece from a first combination
5 of illumination positions and reduced illumination positions so as to limit a
6 first distribution of energy reflected specularly from a workpiece location
7 corresponding to the first portion;
8 generating output signals to produce image data representative of an
9 image of the first portion;
10 illuminating a second portion of the workpiece from a second combi-
11 nation of illumination positions and reduced illumination positions so as to
12 limit a second distribution of energy reflected specularly from a workpiece
13 location corresponding to the second portion, the second combination being
14 non-identical to the first combination as a result of a position of the work-
15 piece portion within the field of view of the imaging system;
16 generating output signals to produce image data representative of an
17 image of the second portion; and

18 detecting the features in images of the first and second image portions
19 based on similarities and differences in the images.

1 2. The method of claim 1 wherein illuminating the first portion and il-
2 luminating the second portion are carried out concurrently.

1 3. The method of claim 1 further wherein the surface features are ma-
2 chine readable marks.

1 4. The method of claim 1 further comprising controllably positioning
2 the field of view of the imaging system after illuminating the first portion so
3 as to view the second portion with the imaging system.

1 5. The method of claim 4 wherein controllably positioning is carried out
2 with a computer-controlled galvanometer-mounted pivotal mirror having a
3 maximum deflection angle, wherein a maximum field of view of the imag-
4 ing system is limited by the mirror deflection angle.

1 6. The method of claim 3 further comprising moving the workpiece
2 relative to the imaging system after illuminating the first portion so as to
3 view the second portion with the imaging system.

1 7. The method of claim 6 wherein moving is carried out with an X-Y
2 stage.

1 8. The method of claim 1 wherein the features are marks on a semicon-
2 ductor wafer.

1 9. The method of claim 1 wherein the features are laser scribed marks on the
2 workpiece, detecting is carried out with by means of a machine vision proc-
3 essor, and wherein illuminating the first and second combinations of illumi-
4 nation positions and reduced illumination positions introduces sufficient
5 contrast between the features and a background to detect the features at any
6 angular location within a field of view of the imaging system.

1 10. The method of claim 1 further including irradiating the workpiece with a
2 laser beam to modify a workpiece surface property wherein a feature is pro-
3 duced by interaction of the laser beam and the workpiece.

1 11. A method of imaging portions of a workpiece comprising:
2 illuminating the workpiece from an illumination position so as to
3 produce reflected energy from at least first and second portions of the
4 workpiece;
5 attenuating, at a first location between an illumination position and an
6 image location, a first portion of the reflected energy so as to limit the dis-
7 tribution of reflected energy incident on an image location corresponding to
8 a first portion of the workpiece;
9 generating output signals to produce image data representative of an
10 image of the first portion;
11 attenuating, at a second location between an illumination position and
12 an image location, a second portion of the reflected energy so as to limit the
13 distribution of reflected energy incident on an image location correspond-
14 ing to a second portion of the workpiece;
15 generating output signals to produce image data representative of an
16 image of the second portion; and
17 detecting the features in images of the first and second image portions
18 based on similarities and differences in the images.

1 12. The method of claim 11 wherein attenuating the first and second por-
2 tions is carried out concurrently.

1 13. The method of claim 11 further comprising irradiating the workpiece
2 with a laser beam to modify a workpiece surface property wherein a surface
3 feature is produced by interaction of the laser beam with the workpiece.

1 14. The method of claim 11 wherein attenuating comprises controllably
2 positioning at least one baffle in a path between an illumination position and
3 an image location.